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ABSTRACT

IBM (International Business Machines Corporation) is committed to education excellence in the United States, particularly in American community, technical, and junior colleges. Community colleges have always had relationships beyond the campus with business and industry, high schools, and other institutions of learning. Today's business and education communities face a number of potentially problematic factors, including cultural differences among the student and workforce populations, a decrease in literacy, drugs, and the exponential increase in daily information that needs to be managed efficiently. Microcomputers and other technological advancements combined with computer software programs, e.g., the Writing to Read program and Principle of the Alphabet Learning System (PALS), are now being used to teach literacy skills. Additionally, IBM works with colleges to develop and implement computer-integrated manufacturing and training programs. Continuing education and the fostering of a vital relationship between schools and businesses will result not only in educational excellence, but also in the training of a capable workforce. (DB)

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"Time to Teach a New World: Education and Technology in the 21st Century"

Remarks by Lucie J. Fjeldstad
IBM Vice President and President,
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at the League for Innovation
in the Community College Conference

Dallas, Texas
October 23, 1990

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Introduction

Good morning, ladies and gentlemen. I'm excited to be here for several reasons.

First, because IBM and the League share some important history. The national seminar that launched the League for Innovation 22 years ago was co-sponsored by an IBM subsidiary--Science Research Associates--along with the UCLA Junior College Leadership Program. Since then, IBM, the League and its member schools have worked together on a number of exciting joint projects, some of which I'll discuss later on.

The second reason is that almost nothing pleases me more than an opportunity to talk about the creative role information technology can play in educating people.

And finally, I'm delighted to be among a group of folks who--as Bart Giamatti once defined the academic mission--engage in "increased intensity of thinking about who we are...and how we live...and about the world around us." In short, a group who cares passionately about life and education and the future.

This morning, I'd like to talk to you about the special challenges community colleges face in teaching a new world, and about how computer technology can help address these challenges.

I'll put my comments in the context of IBM's commitment to education excellence and to working together with you to meet common goals--not simply the goal of an educated workforce, but that of a sophisticated citizenry exercising civic responsibility in a rich and humane culture.

The Community College

Today, community, technical and junior colleges are the largest branch of American higher education. In the United States, more than 1,200 such colleges educate over 5 million college-credit students. Another 5 million students are enrolled in non-credit adult and continuing education programs.

Currently, 43 percent of the nation's undergraduates and 51 percent of all first-time freshmen are enrolled in community colleges, and those numbers are expected to grow in the years ahead.

But when the community college movement began at the turn of the century, it required a good deal of vision to foresee both the need and the potential for success.

William Rainey Harper, who became president of the University of Chicago in 1891, was something of a visionary. Called the "spiritual father" of the community college movement, Harper established a junior college at the University of Chicago. It awarded the country's first associate degree in 1900.

In 90 years, much has changed, yet some things remain constant. One is Harper's view of the community college as a place where students who would not otherwise attend an institution of higher learning could prepare to transfer to a senior college or could, as he put it, "stop naturally and honorably" after two years.

Another is the community college philosophy of inclusion--your commitment to provide quality education to a diverse student body at a reasonable cost.

Today, for example, the average cost of a community college education is $758 a year, compared to more than $10,000 annually for an average four-year school.

And finally, community colleges have always been committed to connections beyond the campus--to partnerships with business and industry, with high schools, and with other institutions of learning.

In sum, the community college has brought a special mission and purpose to post-secondary education. The sense of community participation it brings to the process of learning--and its willingness to use technology to enhance students' abilities to gain knowledge, master new skills and improve the quality of life--all make it unique.

A New World

But today, we stand on the brink of a new century, a century in which more rapid change will test both your resources and your resourcefulness. One of these changes will impact everything from politics to industry, from education to culture. And that's the changing racial and ethnic makeup of our country.

By the year 2050, for example, the "average" U.S. resident will trace his or her roots to Africa, Asia, the Hispanic world, or the Pacific Islands. Already, in California, New York and Florida, the majority of elementary and secondary school children belongs to an ethnic or racial minority.

These students--including large numbers of immigrants--often bring with them the challenges of cultural transition, economic disadvantage, and a native language other than English.

To effectively teach such students, educators must develop creative teaching techniques that work for people of a variety of languages, cultures and backgrounds.

This changing racial and ethnic mix is only part of a larger challenge we face as educators and businesspeople.

The Human Capital Crisis

Our country faces what many are calling a "human capital" crisis--a crisis whose causes are many and sometimes mysterious--but whose symptoms include disturbingly high illiteracy and drop-out rates, and epidemic drug abuse. It's hard to exaggerate the severity of this crisis or its impact on the education and business communities.

American business needs educated employees to make and sell its products, and a company like IBM needs well-educated consumers to make use of them. For IBM and companies like it around the globe, a world-class workforce and an informed consumer population are strategic imperatives--a matter of our very survival. Beyond this, an educated populace helps assure a free and just society, our democratic ideals, and the future of our children.

But in the United States today, an estimated 27 million people--or one in every five--are functionally illiterate. Around the globe, that figure is a staggering 800 million. By the year 2000, it's expected to top one *billion* people.

Coupled with this is a national drop-out rate of 29 percent. According to the Children's Defense Fund, that means every eight seconds of the school day, an American student drops out. That's one million students per year. And of the total who do graduate annually, 700,000 cannot read their diplomas.

What does this mean to U.S. business?

- For a major automaker, it means 20 percent of the workers on its assembly lines can't read their instructional manuals

- For an international electronics firm, it means 80 percent of job applicants can't pass a 5th-grade math test

- And for a life insurance company, it means that because there are too few computer-literate, motivated high-school graduates to process claim forms, the company flies a planeload of claims to *Ireland* each and every day for processing!

In a recent National Alliance of Business survey of the 1200 largest U.S. corporations, 75 percent of those polled said education has not kept pace with the nation's technological growth. Sixty-four percent said they were dissatisfied with the competency of new employees. And on average, the corporations reported they had to interview seven to eight applicants to find just one acceptable employee.

It's no surprise, then, that American business spends about $47 billion annually to train new employees and to retrain those already employed.

What does this mean to community college educators? Among other things, it means upwards of 50 percent of your incoming freshmen need remedial help to prepare them for college-level work.

And then there's the tragedy of drug abuse.

Think about this. In our country, every seven minutes a child is arrested for drugs. Five to eight-million Americans are addicted to cocaine. And 11 percent of pregnant women use drugs.

And now, four-and-five-year-old "crack babies"--many with emotional, intellectual and developmental disadvantages--are entering kindergartens around the country. They'll pose tremendous new challenges to an already overburdened public education system. In 15 years, they'll be your students. And in 20 years, they'll be part of the employee pool from which IBM hires new employees.

An Information Society

And now, think about this. Every two to three years, society's knowledge base virtually doubles. Every day, some 7000 scientific and technical articles are published. Information-gathering satellites send back enough data to fill the 19 million volumes in the Library of Congress to overflowing--every two weeks!

And on any given Sunday, a single copy of The New York Times holds more information than our colonial American ancestors were required to absorb over a lifetime!

Only a generation ago, we could expect to be born, grow to maturity and die in a world not very different from the one our parents knew. We no longer have such expectations.

Someday soon, I fear our collective epitaph will read, "They drowned in a sea of information."

We're bombarded every day from every direction--television, movies, newspapers, magazines, professional journals, radios, data bases, the classroom, the boardroom--with greater and greater amounts of information we're expected to process in shorter and shorter amounts of time.

Ironically, this new need to be information savvy is happening when our ability to process information--that is, when the strength of our human capital--seems less and less able to do so.

And that's the good news!

Good because at a time when our need to "manage" information--to store, retrieve, search, organize and analyze information in order to learn and make informed decisions--is so acute, we have the technology equal to the task.

Multimedia Computer Technology

We have the computer. And today, with interactive multimedia technology--which brings sight, sound and touch to computers--we have an even more potent way to reach students and impart knowledge.

On the one hand, computer technology can be used to teach reading and writing skills to remedial students. And on the other, higher-level students can do the most sophisticated chemistry lab experiments, for example, on their multimedia computer workstations.

We'll be looking at both ends of that spectrum.

But before we do, let me mention that multimedia has other creative uses--like the visuals that are part of my presentation this morning. All the visuals you see are running on an IBM PS/2 using the M-Motion Adapter. With it, users can combine audio, high-resolution computer graphics and full-motion video. The video windows you see can be sized and positioned anywhere on the screen.

I believe it's important to introduce children early on to the excitement of creative learning. IBM's Writing to Read program currently reaches more than two million pre-school, kindergarten and first-grade students in more than 7,000 schools around the United States. Writing to Read uses voice, video and text to teach young children how to write what they can say and how to read what they've written. All this, before children have mastered the intricacies of formal spelling.

Studies reveal that, on average, students in Writing to Read programs read two to three grade levels above their peers.

Results like this convinced Mississippi Governor Ray Mabus to install Writing to Read in all 439 Mississippi elementary schools, with a goal of eliminating illiteracy in his state by the year 2000.

A Writing to Read program called VALE helps Spanish-speaking children make the transition to English.

Dr. John Henry Martin, who created our Writing to Read program, has also developed a self-paced literacy program for adolescents and adults, called PALS--or Principle of the Alphabet Learning System.

PALS is a multimedia application that presents a highly engaging mix of images and sound that helps adult students learn to read by seeing, touching, speaking and hearing. A number of community colleges currently have PALS labs. Richland College right here in the Dallas Community College District has a PALS installation you might want to see while you're in the area.

In one pilot program, adult students increased their reading levels by four grades after completing the six-month PALS program.

One of the real advantages of multimedia is its ability to engage us. Studies reveal that students remember 20 percent of what they hear; 40 percent of what they see and hear, and 75 percent of what they see, hear and do. Multimedia changes students from passive recipients of information to active participants in the learning process.

This is the quality IBM and the National Federation of State High School Associations focused on when we developed a multimedia program designed to change young people's attitudes on issues like drugs and alcohol, the high school drop-out rate, teenage pregnancy and AIDS.

The result is TIP--for Target Interactive Program--a multimedia computer application that uses interactive video drama to help students discover the consequences of their behavior. In one of the stories, characters at a party make decisions regarding the use of drugs and alcohol. Depending on the choices students make for their characters, 16 different endings are possible.

The program helps students learn to say no, and the real-life consequences of saying yes.

These computer applications help young people on their way to becoming your students. Others are aimed at helping students once they're inside your doors. Let's look at some, including those developed jointly with the League and its member schools.

Community College Applications

Using a product solution from IBM, Miami-Dade Community College and Sante Fe Community College developed applications to more easily assess students' entry-level skills so new students can be assigned to appropriate skill development courses.

In February of this year, more than 50 faculty and staff representing a number of community colleges--all of them League for Innovation members--met with IBM at Miami-Dade Community College to kick-off a major initiative to deal with one of the most daunting challenges facing community colleges--the development and application of technology to improve the teaching of basic skills to underprepared students.

Project Synergy is the result of this meeting. During this two-year program, Miami-Dade and 21 other community and four-year colleges and universities will test and evaluate computerized curricula designed to help underprepared students improve their basic reading, writing and math skills.

CIM in Higher Ed

Another program that addresses the community college commitment to training and retraining America's workforce is "CIM in Higher Ed," in which IBM works with two-and-four-year colleges to develop and implement computer-integrated manufacturing and training programs.

Through this program, we provide the CIM equipment and training, while the schools run the CIM education, including support and training for both students and local companies.

Seventy-five colleges and universities now participate nationwide in this program which was established in 1988. Two-thirds--or 49 of these institutions--are community colleges, including Central Piedmont, Foothill-DeAnza, Fox Valley Technical, Monroe, and Moraine Valley. CIM in Higher Ed schools work together to develop leading-edge CIM curricula; provide hands-on training for students and workers in manufacturing lab environments; and help local businesses test manufacturing processes to meet their own firms' needs.

More than 1,000 industrial workers were trained in 1989, and more than 10,000 students are participating in the programs this year.

Computer Instruction

At IBM, we recognize that wanting to use computer technology in the classroom and having the information and skills to do so are not always the same thing.

One of the ways we help college and university faculty gain the information and expertise needed to use computers effectively in classroom instruction is through our Instructional Technology Transfer Centers at community colleges.

Established in 1988 by IBM and the League for Innovation, the centers are designed to encourage the use of computer technology by faculty, staff and administrators; provide training for computer-application software; and facilitate sharing of computing expertise among faculty, staff and administrators. Since 1988, more than 7,500 faculty and staff have participated in training sessions, seminars and demonstrations. Today, there are nine centers in the United States and one--at Humber College--in Canada.

A community college data base--part of a system that offers free access to higher ed users--also provides information about resources in instructional computing. Johnson County Community College established the Community College IBM Information Sharing System as a data base and clearinghouse for information on academic software and other IBM-related instructional projects.

The Technology Transfer Center at Kirkwood Community College provides hands-on time, demonstrations, and seminars to help faculty and staff evaluate higher education software.

The Campus of the Future

To address the issues of distance learners, part-time students and faculty, and other challenges facing community colleges, IBM--like William Rainey Harper--has a vision. It is a vision of the campus of the future--a campus linked by high-speed fiber-optic technology and multimedia computer applications.

Let's look at what such a campus might offer students and how it could help you fulfill your education mission, whether that mission is history or science or music.

Here's Kelly, a music major.

Three times a week, Kelly studies with Kim, a prominent Korean piano master.

Kelly lives in California, and studies music at Bakersfield Community College. Kim lives and works in Korea.

They're connected by an interactive computer network that allows two electronic keyboards to be played by Kim and Kelly as if they were side-by-side. Kim's voice and image are available to Kelly, and vice versa.

Joe and Marie are two of over a hundred students attending Dr. Johannsen's course on quantum mechanics at a Maricopa District College. The "class" is distributed to over a dozen different universities and two-year colleges in the U.S., Germany, Great Britain, and Russia.

The students correspond regularly and instantly via electronic mail which now includes images, data, voice, and full-motion video. A computer automatically translates their different languages. The students are currently conducting an experiment.

But where is the experiment taking place? On which campus? In which country?

The answer: all places at once.

The experiment is a student-controlled computer simulation on the network.

In the learning centers of tomorrow, horizons will be greatly expanded with distance learning, electronic simulations and personalized education.

Some of this will happen even before students get to your campuses.

Here's Ben, a high school senior, choosing the community college he'd like to attend. Without ever leaving his home, he "visits" the colleges that interest him, talks to students at Cuyahoga Community College and at Sinclair Community College.

He gets his application forms, inquires about financial aid, and is interviewed. After he's been accepted, he reviews the catalog and registers for first-term courses.

All of this means routine paperwork can be simplified, community colleges can reach out to more potential students, and enrollments can be increased.

Colleges of the future will be able to reach students in isolated places with courseware individually designed so students can learn at their own pace, in their own way. For example, Jeff is learning about forest management right in his own apartment.

He's online to an upstate community college, using courseware tailored to his own style of learning.

This is important, because Jeff has a learning disability. He's dyslexic.

By the time Jeff is ready to become a full-time student, he'll have taken a semester's worth of courses. He will have seen tree farms in Oregon, through software developed at Lane Community Collge; observed forestry practices in Washington State, with software designed by Seattle Community College District; and met repeatedly with instructors and fellow students, all via his multimedia computer.

Finally, here's Ph.D. candidate Janet, a faculty member at Delta Community College in Michigan, working on her dissertation. It's getting very long, so she stores it in her department's computer. When she needs a report on a specific aspect of her subject, she does a network search and the material is quickly transmitted to her desktop.

That's what we call "knowledge on demand."

When she needs to do complex computing, she simply taps into a supercomputer like those available through NSF NET, the National Science Foundation Network.

And finally, when Janet's ready to publish, no trees have to be cut down. Instead, researchers and colleagues can browse through Janet's dissertation at their convenience at their own workstations. It comes complete with images, sound and full-motion video.

From Vision to Reality

This vision of the campus of the future is closer than you might expect.

But to make it a reality will take the leadership, action and cooperation of all of us in this room today.

First, the computer and telecommunications industries, governments and international agencies, as well as college professors and administrators, must work together to recommend and develop standards that enable users to talk to one another easily and instantaneously--across the nation or around the world.

Second, we must provide you with solutions that make it easy and attractive to use computers in creative ways.

At IBM, we're working to do just that. From our Advanced Academic System that enables faculty to easily create instructional materials and classroom presentations, to our Academic LANkit with which teachers can manage, customize and administer lessons on classroom computers connected in a LAN--a Local Area Network--we're listening and responding to your needs and requirements.

Third, we must, together, find ways to make educational software more available and less costly. One way is to make it more rewarding for members of the academic community to spend time developing courseware for their classes. In 1986, IBM and St. Louis Community College established one of the first community college computer labs in the country for this purpose. And in 1988 and 1989, we sponsored a Competition for Excellence that encouraged faculty members to create quality software.

And last--but most important--we must learn more about each other.

Companies like IBM must make an even greater effort to understand the education environment--your challenges and your requirements.

IBM's Multimedia and Education Division

We think we've taken an important step in that direction. On June 26 of this year, I was named to head a new division--the Multimedia and Education Division--which encompasses all our marketing and development activities in K-12, higher education and lifetime learning.

The establishment of this division is an important turning point in IBM. It sends a strong signal that education is a top priority in all that we do as a company.

It's a recognition that multimedia technology will forever change the ways people teach and learn and live and work. And it's a commitment to develop and market multimedia application solutions that best serve the goals I believe many of us share--improved education opportunities for the people of the world.

H. G. Wells once wrote, "Human history becomes more and more a race between education and catastrophe."

I believe computer technology gives us the edge we need to win that race.

It also gives us an opportunity to extend our capabilities as individuals, to reach new levels of excellence, and to make education an integral part of our lives--all our lives long.

Looking Ahead

We recognize community colleges as a distinct and vitally important segment of higher education. We understand the critical role community colleges play in guaranteeing access to higher education for all people in society, in training and retraining a workforce to compete in a global economy, and in providing essential skills to underprepared students and adults to help them become productive citizens.

We look forward to continuing to work closely with you to achieve these goals.